ALASKA FEDERAL OFFSHORE
Descriptions of Geologic Plays
1995 National Resource Assessment
U.S. Minerals Management Service

HOPE BASIN ASSESSMENT PROVINCE
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Play 1 (UAHB0101[1]). Late Sequence Play: This play includes all Oligocene(?) and younger sediments in the assessment area. Shallow shelf or fluvio-deltaic sandstones form the most likely reservoir rocks. Two exploratory wells drilled in Kotzebue basin indicate that these rocks are highly porous. Organic material in the wells is cellulosic, with hydrogen indices generally below 200 mgHC/gTOC, indicating that any hydrocarbons produced would probably be gas. Total organic carbon (TOC) values average over 1.0%, but are associated with coals and confined to the upper, thermally immature part of the sequence (Mobil E&P, 1981). Only very small volumes of this sequence, in the deepest parts of the basin, reach thermal maturity. Hydrocarbons would have to migrate into Late Sequence reservoirs from underlying, thermally mature sources in older sequences. Traps within the Late Sequence play were formed during the second, or Miocene, stage of faulting, well before the deepest sediments reached thermal maturity, probably in Pliocene or Pleistocene time.

Play 2 (UAHB0201). Early Sequence Play: This play consists mostly of Eocene(?) rocks. The Kotzebue basin wells penetrated rocks of Eocene age that are highly volcaniclastic and therefore subject to diagenetic processes of porosity destruction. Coupled with greater burial depth, this causes the reservoir potential of the Early Sequence play to be considerably lower than that of the Late Sequence play. We speculate that reservoirs consist primarily of fluvio-deltaic sands and conglomerates deposited along the edges of rift grabens. Organic matter is cellulosic, hydrogen indices are generally below 200 mgHC/gTOC, and TOC values average <0.5% in the Kotzebue basin wells (Mobil E&P, 1981). The source potential of these rocks is therefore very poor. The Early Sequence reaches thermal maturity in the central areas of both Hope basin and Kotzebue basin beneath Kotzebue Sound. Most of the Early Sequence sediments reached thermal maturity late in the deposition of the overlying Late Sequence (Oligocene and later). By that time faulting would already have formed abundant traps for migrating petroleum.

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[1]*The "UA" Code is the "Unique Assessment Identifier" for each play, and is the principal guide to GRASP data files.*

Plays 3 (UAHB0301 - Shallow Basal Sand Play) and 4 (UAHB0401 - Deep Basal Sand Play): The Basal Sand plays were defined to acknowledge the possible existence of sands (inferred by analogy to Norton basin) creating potential trap volumes at the base of basin fill. The two plays are separated at a burial depth of 10,000 feet, because density log porosities in the Kotzebue basin wells are predicted to fall below 10% at this depth when extrapolated using the Norton basin porosity decline rate. The preservation of a viable reservoir is therefore less likely in the deeper play. Potential source rocks would include the limited gas-prone organic material sampled in Early Sequence rocks in the two Kotzebue basin wells. Other petroleum sources of a speculative nature might include older, unsampled rocks in the deeper parts of Hope basin, or basement rocks. The Shallow Basal Sand play, by definition shallower than 10,000 feet, lies laterally apart from the zone of thermally mature strata. Lateral migration, unlikely because of the abundant faulting and apparent lack of a regional seal, would therefore be required to charge prospects in this play. The Deep Basal Sand play lies entirely within the thermally mature area, and is best positioned to be charged with hydrocarbons expelled from thermally mature source rocks.

OIL AND GAS ENDOWMENTS OF HOPE BASIN PLAYS
Risked, Undiscovered, Conventionally Recoverable Oil and Gas

PLAY NO.	PLAY NAME (UAI * CODE)	OIL (BBO)			GAS (TCFG)		
		F95	MEAN	F05	F95	MEAN	F05
1.	Late Sequence (UAHB0101)	0.000	0.090	0.262	0.000	3.341	9.368
2.	Early Sequence (UAHB0201)	0.000	0.011	0.039	0.000	0.387	1.331
3.	Shallow Basal Sands (UAHB0301)	0.000	0.009	0.037	0.000	0.333	1.387
4.	Deep Basal Sands (UAHB0401)	0.000	0.00009	0.0006	0.000	0.004	0.026
	FASPAG AGGREGATION	***0.000***	***0.110***	***0.343***	***0.000***	***4.064***	***12.673***

* *Unique Assessment Identifier, code unique to play.*

REFERENCES CITED

Mobil E&P (Exploration and Producing Services). 1981. Visual Kerogen, Thermal Maturation,

TOC and Rock-Eval Analyses, SOCAL Cape Espenberg #1 and Nimiuk Point #1 Wells, Kotzebue, Alaska. *In:* Geochemical Reports Prepared by Mobil for the Alaska Oil and Gas Conservation Commission, Dept of Nat Resources, Division of Geol and Geoph Surveys, Eagle River, Alaska, Report No 15, 44 pp.